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On July 15, 2004 several wire samples were taken to the TD SEM in Lab 3. Donna Hicks and Deepak Chichili operated the equipment.

The wire samples were mounted on an aluminum holder that was 2 inches in diameter. The wire samples were in the following order: reverse aged in SS tube, aged wire, new wire, reverse aged in GMC, and additionally aged in GMC. The new wire (in the center of the holder) was taken directly off a spool of new wire. All the aged wires started with a piece of wire taken from the higher z region of the wire plane removed from SL2 of the COT in March 2004. All the reverse aging was done with a Sr90 source. Under all conditions the Sr90 source was found to reverse age the wires irradiated by it. The reverse aging in the SS tube was done in exhaust gas from the COT in early July (argon/ethane plus1.7% isopropanol and about 100 ppm of O2). The wire that was reverse aged in the GMC was with argon/CO2 (80/20). The wire that was additionally aged in the GMC was away from the Sr90 source with argon/ethane plus 1.7% isopropanol with no added oxygen (however no measurement of the oxygen content was made).

All the SEM measurements were made with a 10 keV electron beam which always shows some of the gold beneath whatever coating there is on the wire. This electron beam was not energetic enough to see the tungsten of the wire unless the gold coating had been removed. The basic COT wire is 40 micron tungsten with about 0.5 gold coating.

The following pages show the EDS analysis of the wires. The following atomic percentages are observed:

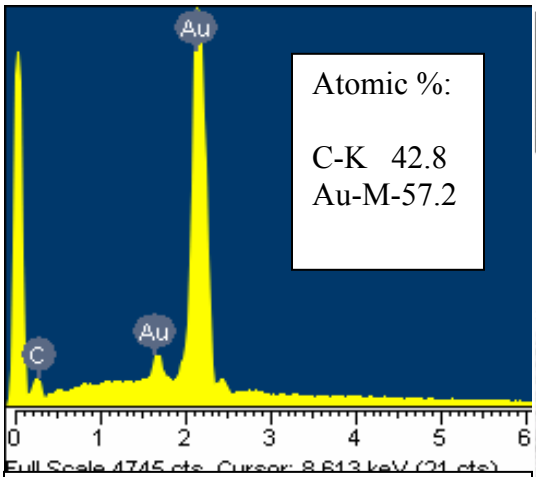
New wire: 43% carbon and 57% gold

Aged wire: about 85% carbon, 4% oxygen, and 11% gold

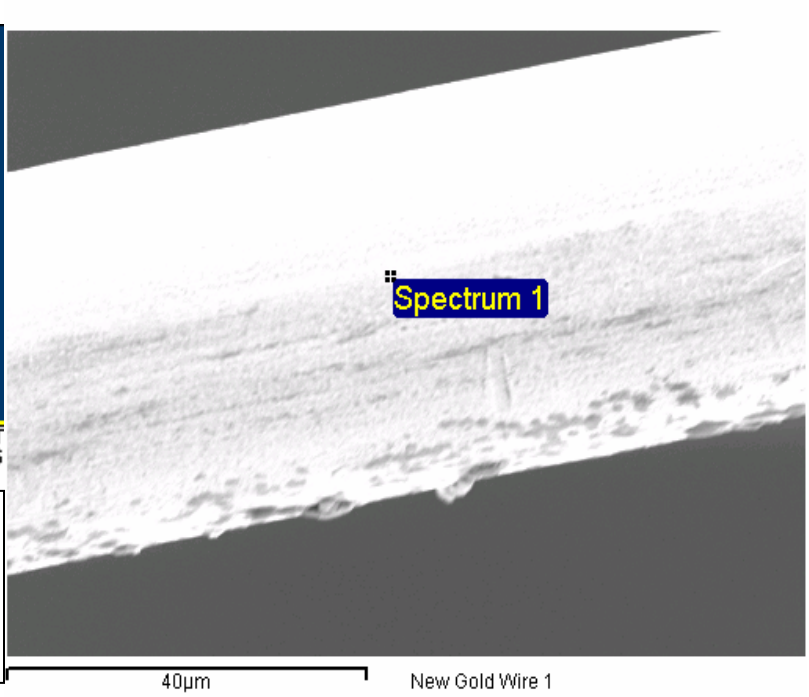
Reversed aged SS tube: about 65-75% carbon, 25-35% gold and very l little oxygen.

Reverse aged GMC: Less carbon but more oxygen.

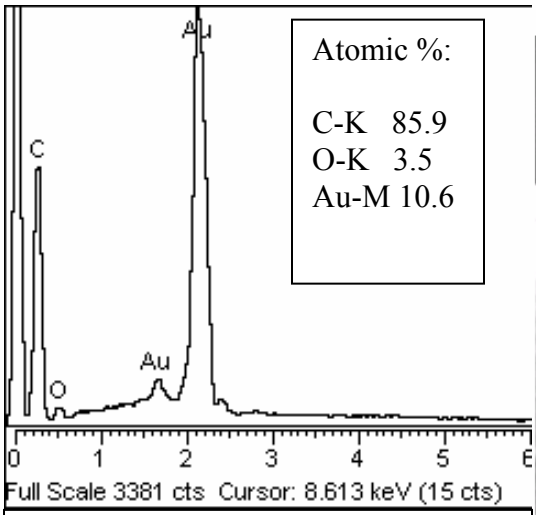
New wire



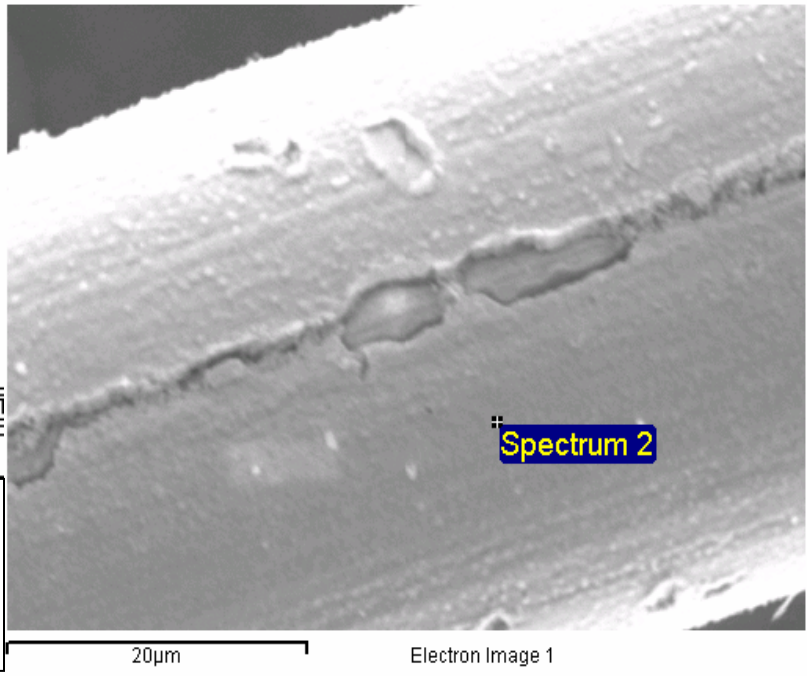
EDS analysis of a new wire directly from the spool. The surface appears bright. Mostly gold is seen; the carbon is appears to be background.



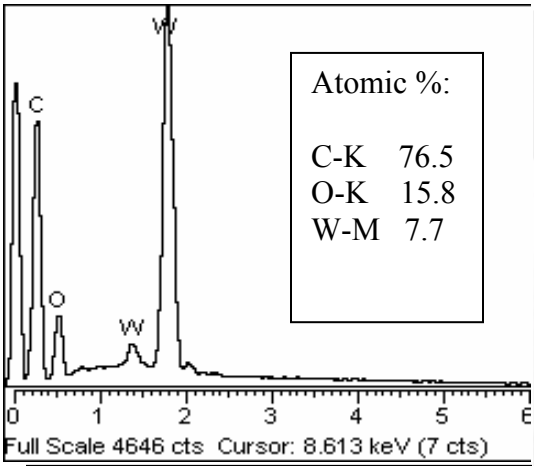
Aged Wire general area



EDS analysis of the aged wire near the center in a general area. The surface is duller. Mostly carbon with a little gold and oxygen are seen.



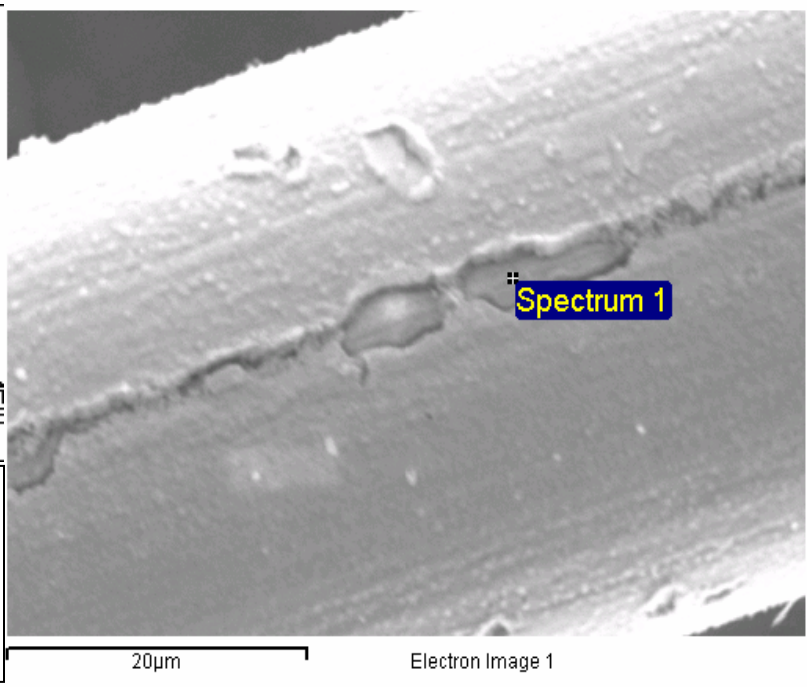
Aged wire crater



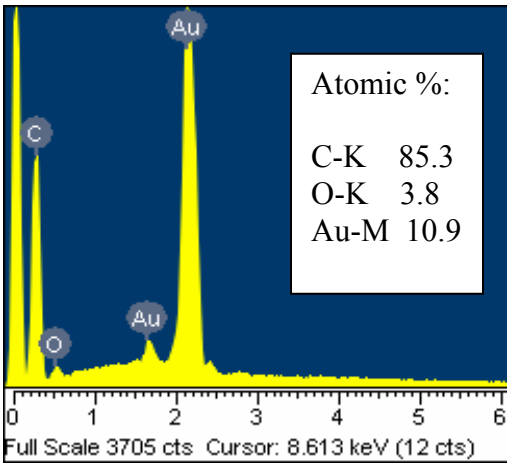
Atomic %:

C-K 76.5
O-K 15.8
W-M 7.7

EDS analysis of a crater near the center of the aged wire. Tungsten is seen instead of gold. The carbon polymer coating is still seen. Also the oxygen level is high (WO?).



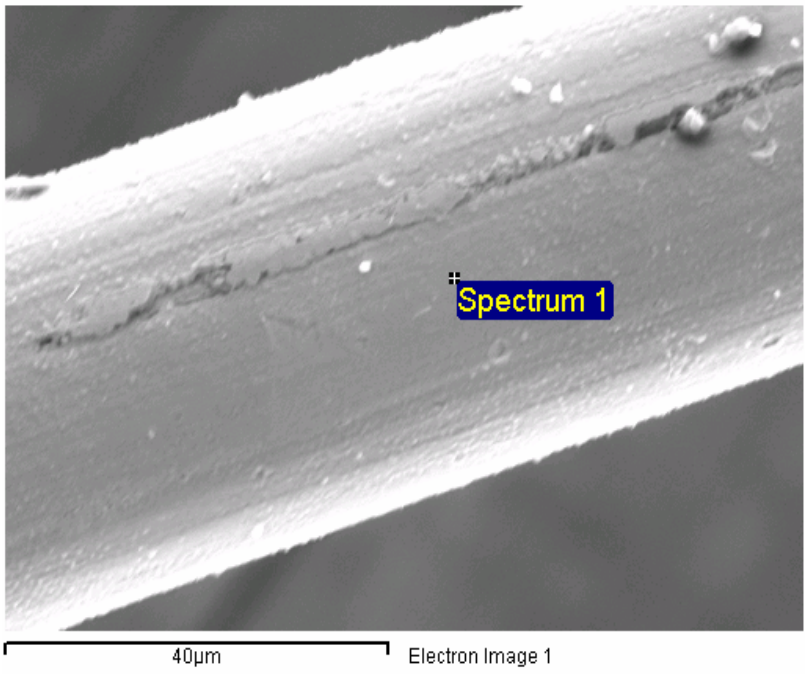
Aged wire general area



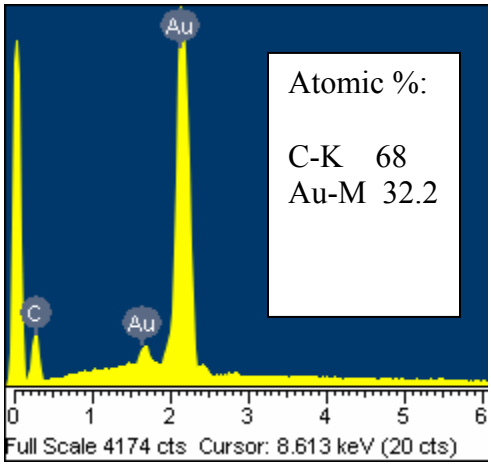
Atomic %:

C-K 85.3
O-K 3.8
Au-M 10.9

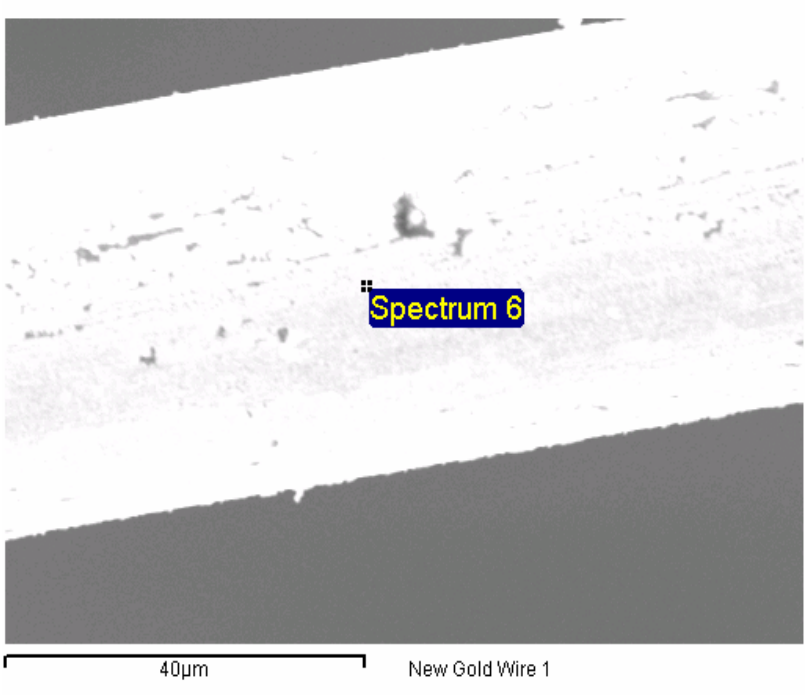
EDS analysis of another general area on the aged wire near the center. Very similar to the previous general area on an aged wire,



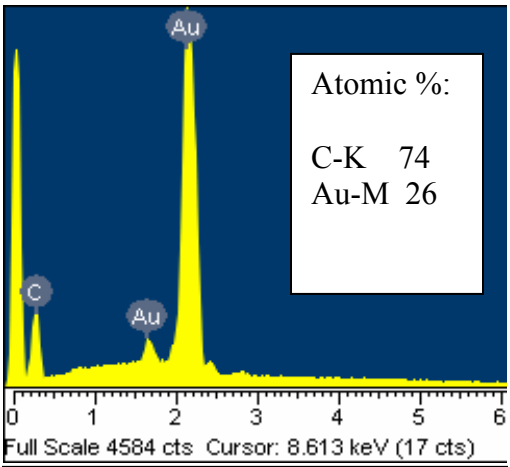
Reverse aged in SS tube at center.



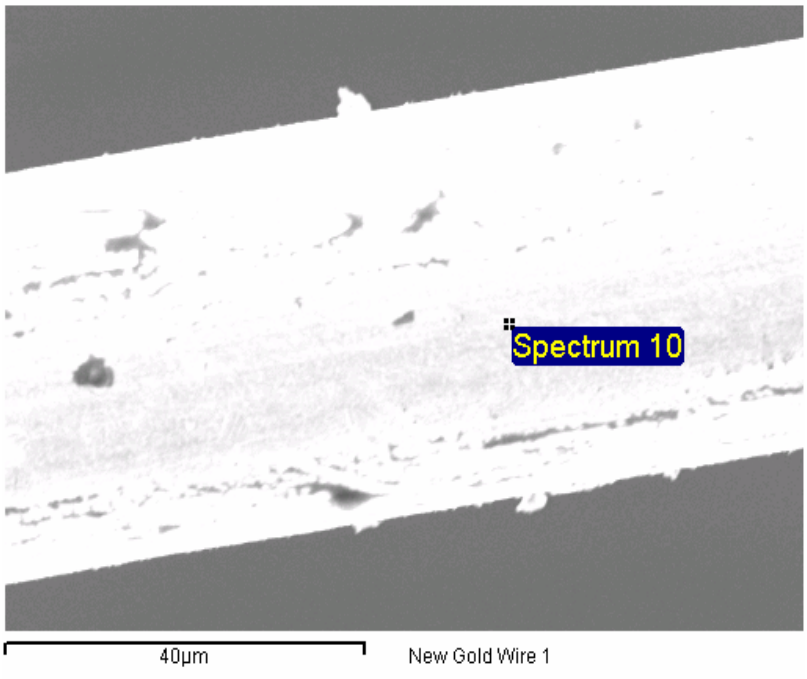
EDS analysis of the wire reverse aged in SS tube with COT exhaust gas (~100ppm of O2). Surface brighter than aged wire, but more carbon than on new



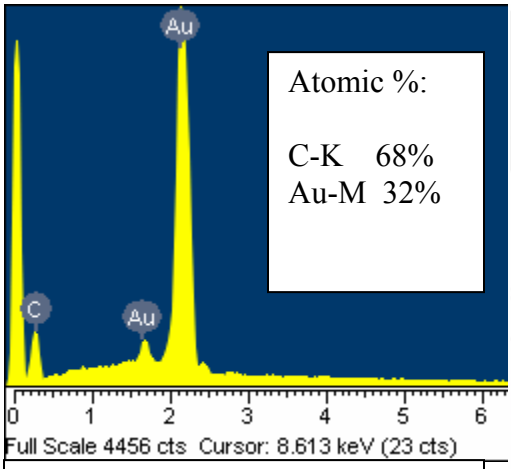
Reverse aged in SS tube at center.



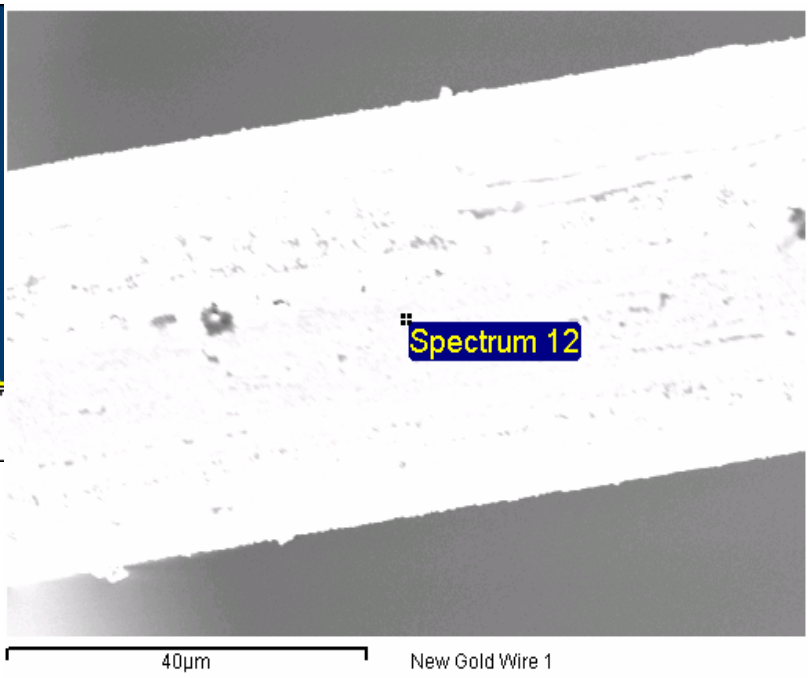
EDS analysis of the wire reverse aged in SS tube with COT chamber exhaust. Wire surface looks brighter than age wire, but more carbon seen than on new wire.



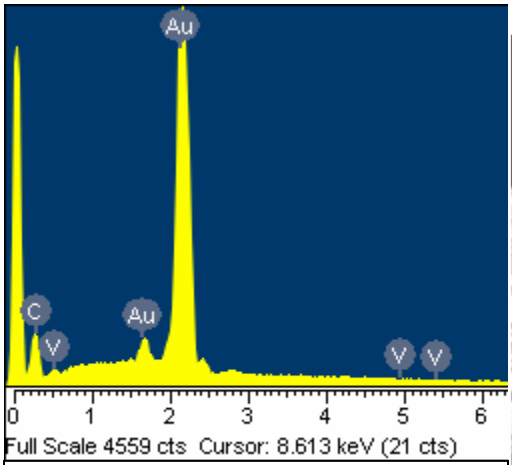
Reverse aged in SS tube 6mm right of center.



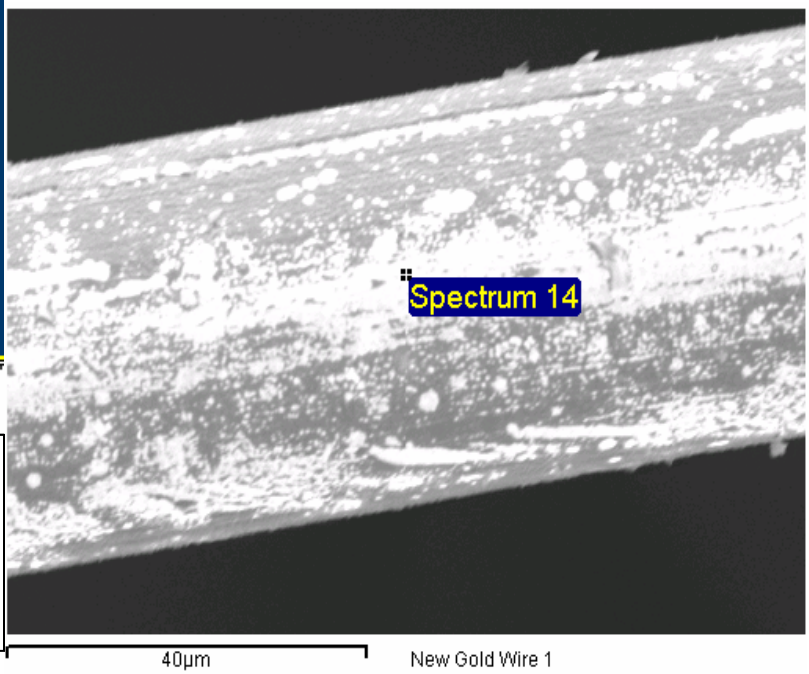
EDS analysis of the wire reverse aged in the SS tube chamber with COT exhaust gas. Wire surface looks brighter than aged wire, but more carbon than new wire.



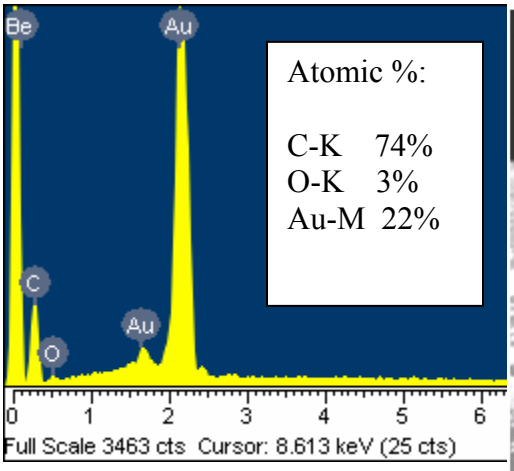
Reverse aged in SS tube 20mm right of center



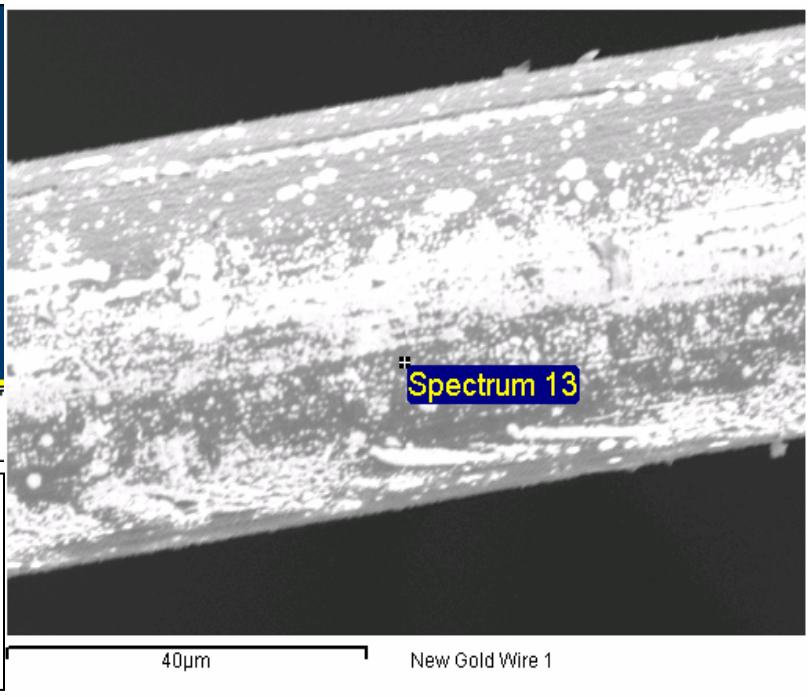
EDS analysis of the wire reverse aged in the SS tube 20mm from the center. There are bright and dark areas on the surface. Analysis of the bright area shows less carbon.



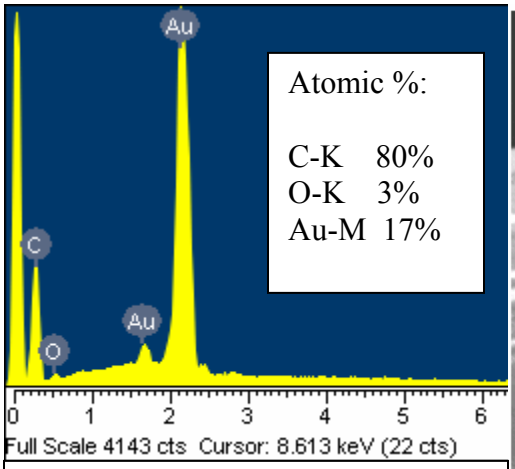
Reverse aged in SS tube 20mm right of center



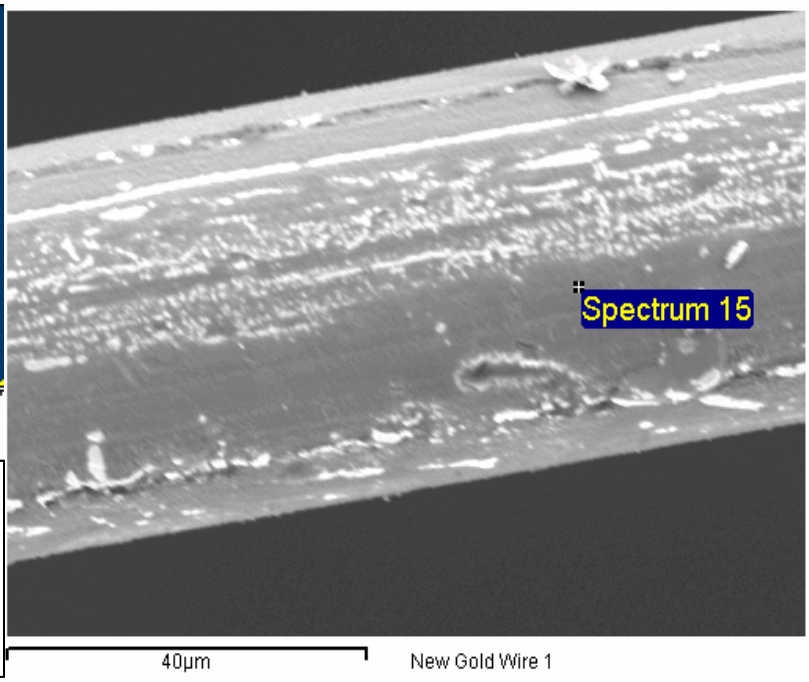
EDS analysis of the wire reverse aged in the SS tube 20mm from the center. The bright areas have been reverse aged more. The analysis of the dark area shows more carbon.



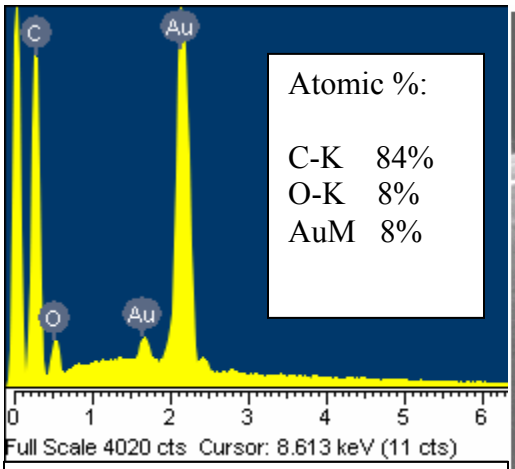
Reverse aged in SS tube 30mm right of center



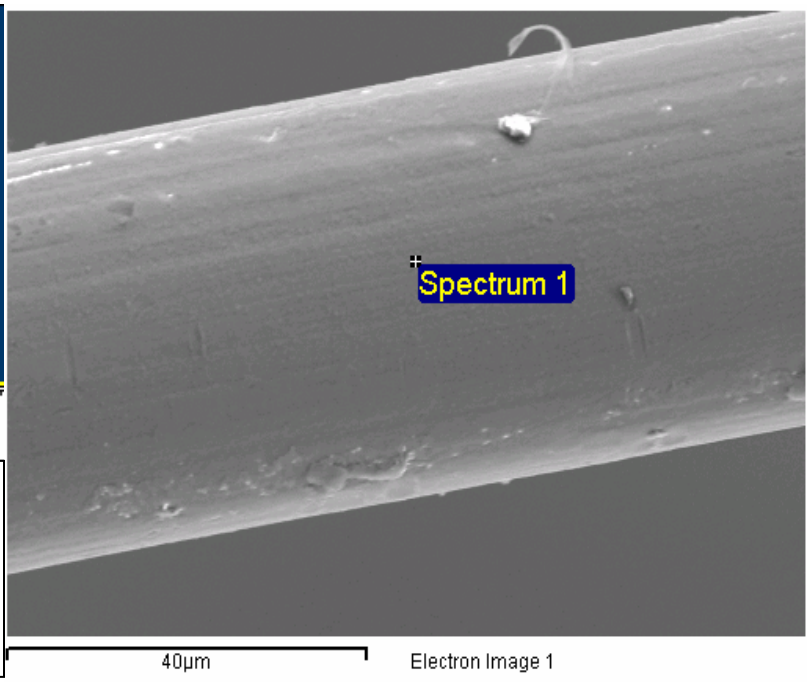
EDS analysis of the wire reverse aged in the SS tube 30mm from the center. The wire is mostly dark indicating more coating. Analysis shows more carbon than at 20mm.



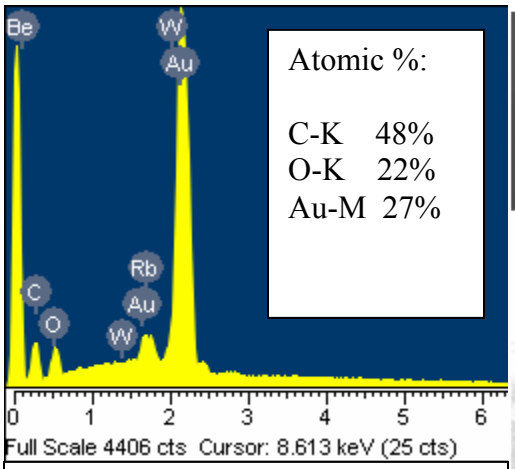
GMC wire with more aging shown at its center



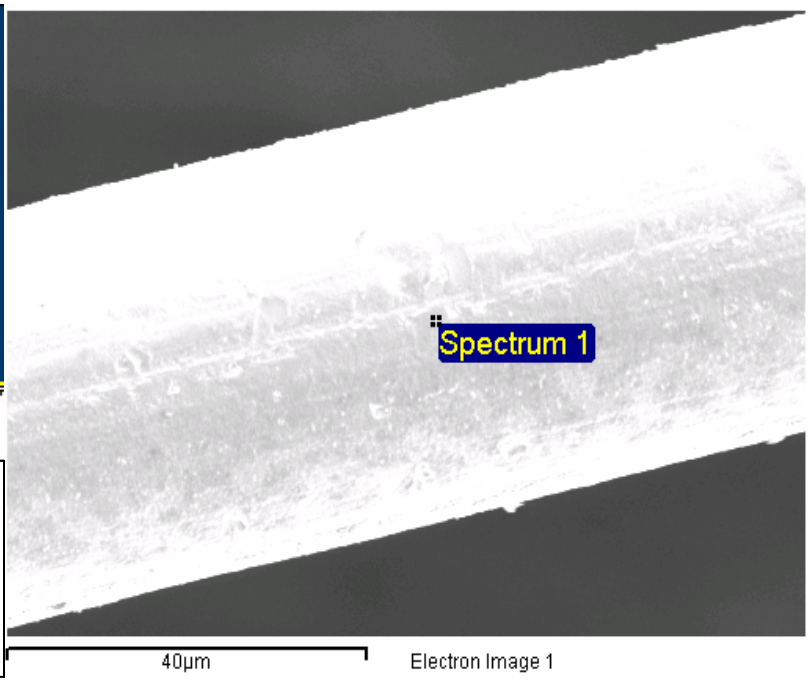
EDS analysis of the wire away from the source in the GMC that was additionally aged. The coating is dark and the carbon and oxygen levels are high.



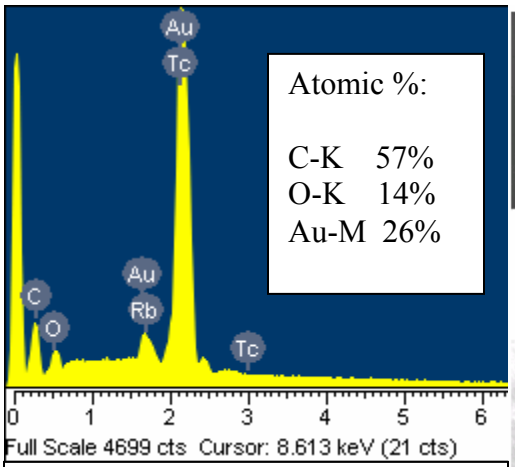
Reverse aged GMC wire at the center (avg2)



EDS analysis of the wire reverse aged in the GMC (Ar/CO2) at the center. The surface is bright and the carbon level is relatively low, but the oxygen level is higher.



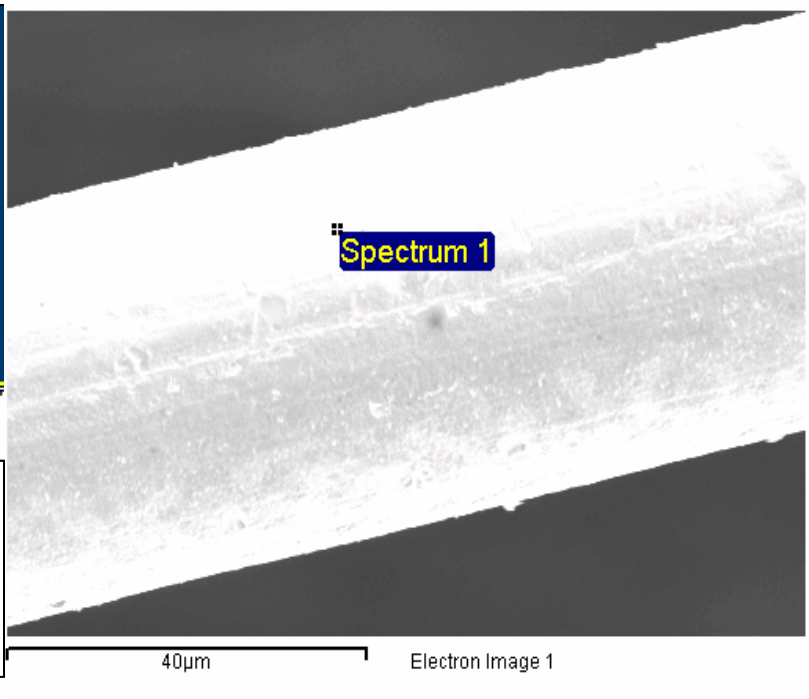
Reverse aged GMC wire at the center (avg3)



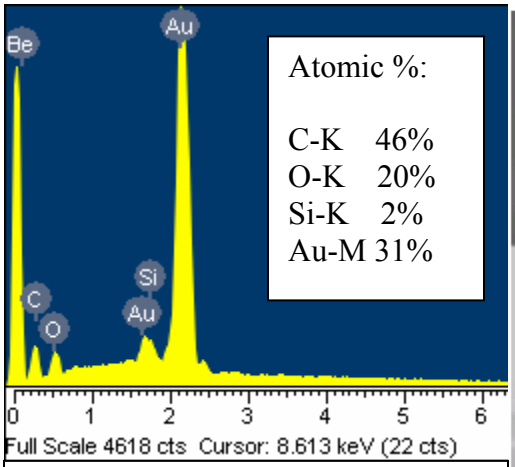
Atomic %:

C-K 57%
O-K 14%
Au-M 26%

EDS analysis of the wire reverse aged in the GMC (Ar/CO2) at the center. Similar to above, but a little less oxygen. Possible traces of Rb and Tc at the 1% level.



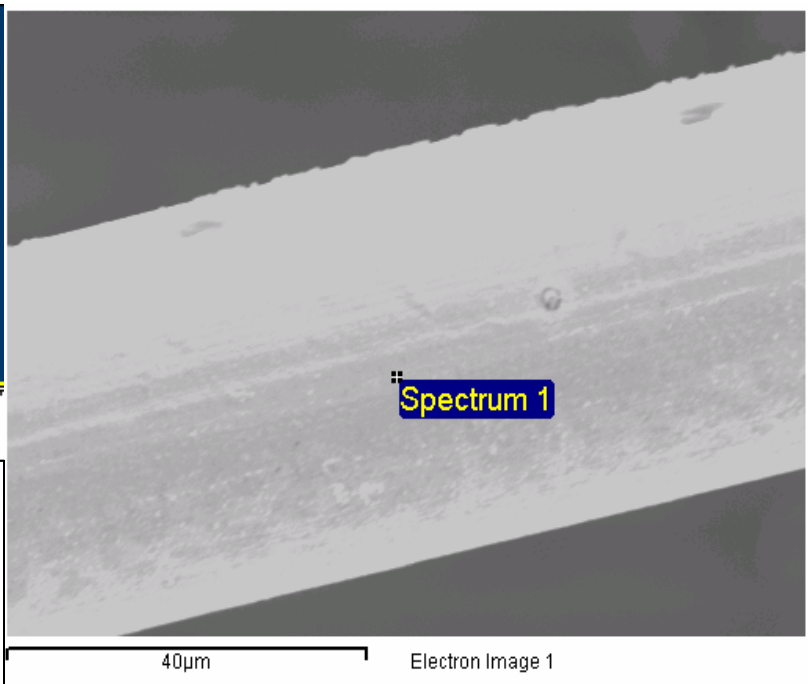
Reverse aged GMC wire at the center (avg)



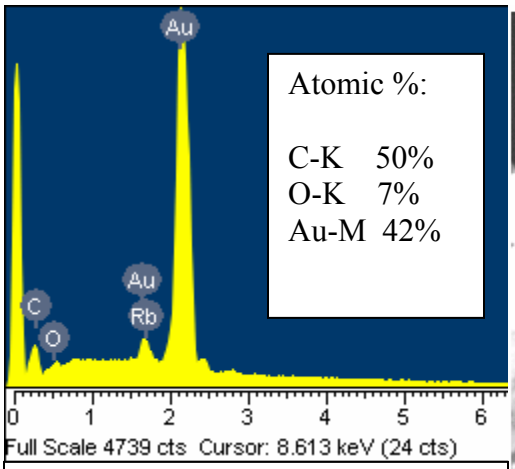
Atomic %:

C-K 46%
O-K 20%
Si-K 2%
Au-M 31%

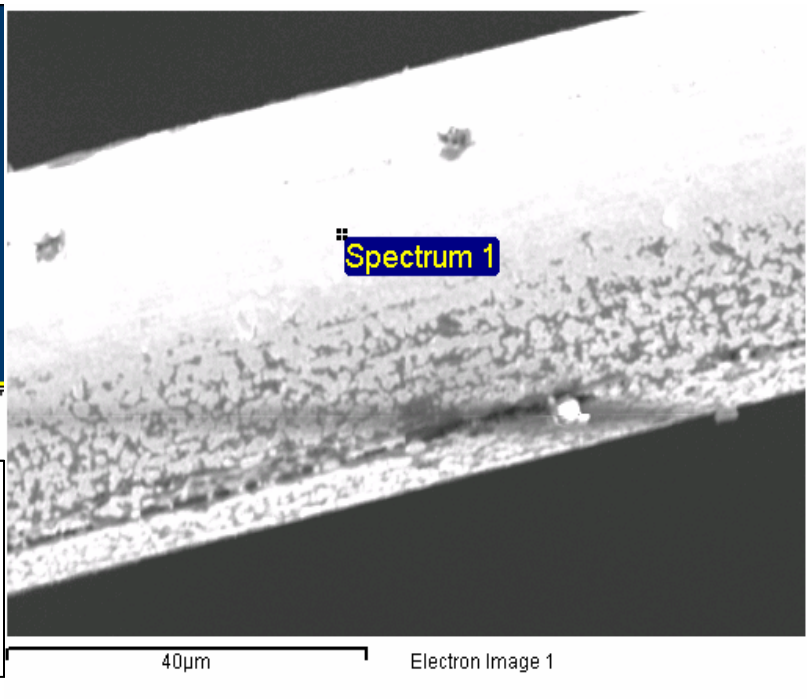
EDS analysis of the wire reverse aged in the GMC (Ar/CO2) at the center. Similar to the previous two, More oxygen and less carbon than for the wire reverse aged in the SS tube.



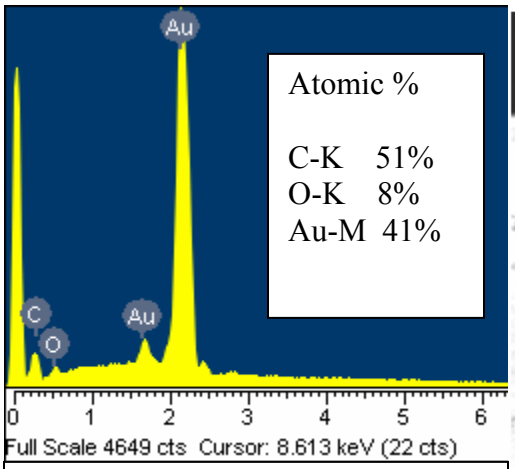
Wire reverse aged in GMC to the left of center



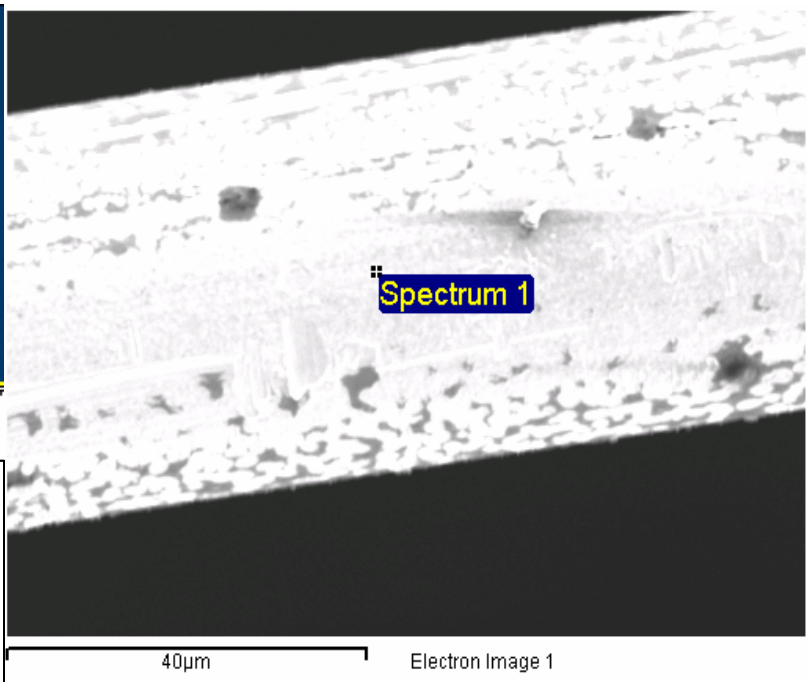
EDS analysis of wire reverse aged in the GMC (Ar/CO2) to the left of center. There are darker areas on the wire but the bright spot that was analyzed shows very little carbon.



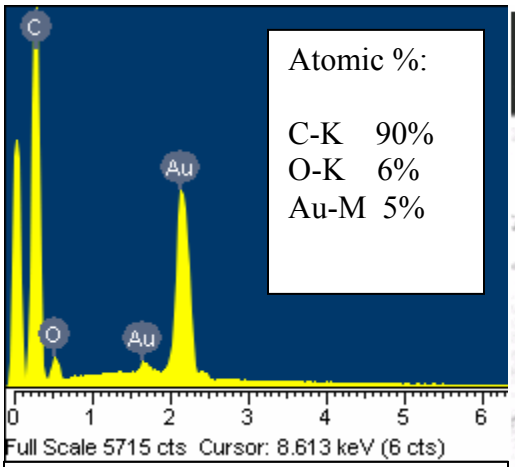
Wire reverse aged in GMC to the right of center



EDS analysis of wire reverse aged in the GMC (Ar/CO2) to the right of center. The surface is in general bright with some dark areas. Again carbon levels low, but oxygen levels may be a little higher.



Dark spot to the right of center on wire reverse aged in GMC



EDS analysis of dark spot to the right of center on wire reverse aged in GMC (Ar/CO2). This spot is very near the bright area analyzed above. The carbon level is very high.